abs conv. $\sum|a_n|$ conv., $\sum a_n$ must also conv.

cond. conv $\sum|a_n|$ diverges but $\sum a_n$ conv.

neither conv.
(both div.)
$\sum|a_n|$ div, $\sum a_n$ div

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abs. conv on $(-2,-1)$

no conditional conv.

$1+\frac{1}{2}+\frac{1}{4}+\frac{1}{8}+\frac{1}{16}\cdots = 2$

$1+\frac{1}{2}+\frac{1}{3}+\frac{1}{4}+\frac{1}{5}\cdots$ diverges

conv. to 2

$\sum\frac{1}{n^p}$ Harmonic

$\sum\frac{1}{n}$ p series, $p=1$ div.

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60. a) $\ln(1+x) = x - \frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4} \cdots (-1)^{n-1}\frac{x^n}{n}$

b) $\lim_{n\to\infty}\left|\frac{x^{n+1}}{n+1}\cdot\frac{n}{x^n}\right| = |x| < 1$ ratio test

$-1 < x \leq 1$

endpts:

$x=1$ $1 - \frac{1}{2} + \frac{1}{3} - \frac{1}{4}\cdots$ alt. harmonic conv. by AST

$x=-1$ $-1 - \frac{1}{2} - \frac{1}{3} - \frac{1}{4}\cdots$

$-\left(1 + \frac{1}{2} + \frac{1}{3} + \frac{1}{4}\cdots\right)$ div. - harmonic

conv absolutely on $(-1, 1)$

Conv conditionally at $x=1$

$(-1, 1]$

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truncation error

.4055 .4073

$\ln\left(\frac{3}{2}\right) \approx \frac{1}{2} - \frac{(1/2)^2}{2} + \frac{(1/2)^3}{3} - \frac{(1/2)^4}{4} + \frac{(1/2)^5}{5}$

$\ln(1+x) = x - \frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4}\cdots$

$x = \frac{1}{2}$

$\frac{f^5(a)x^5}{5!} \left\{ \epsilon < \left|\frac{(1/2)^6}{6}\right| \right.$

.0018 .0026

$\epsilon < \left|\frac{M\ x^{n+1}}{(n+1)!}\right|$ $\ln\left(\frac{3}{2}\right) \approx .4073 \pm .0026$

M is the max value of $f^{n+1}(x)$

$\frac{Mx^6}{6!}$ M is max of $f^6(x)$

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$$\epsilon < M \frac{f^{n+1}(a)}{(n+1)!}$$

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